55th Way Landfill
Long Beach, California
Targeted Brownfields Assessment
Final Report

Contract No.: 68-W-01-012
TDD No.: 09-00-12-0003
Project No.: 0003.01.BR

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Prepared for:

U.S. Environmental Protection Agency

Superfund Technical Assessment and Response Team

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1 Introduction

The United States Environmental Protection Agency (USEPA) directed Ecology and Environment, Inc.'s (E & E's) Superfund Technical Assessment and Response Team (START) to collect and analyze soil and soil-gas samples for a Brownfields Targeted Site Assessment at the former 55th Way Landfill site in Long Beach, Los Angeles County, California.

The City of Long Beach is investigating the feasibility of redeveloping the site as a park with recreational facilities. During operation as an unregulated cut-and-cover landfill, as well as subsequent operations as diesel repair and gun drilling facilities, a variety of substances may have potentially impacted the soil of the landfill cover/cap at the site. In addition to methane, which is commonly associated with decomposition of landfill materials, these substances include volatile and semi-volatile organic compounds, metals, and petroleum hydrocarbons. It is necessary to characterize contaminants present in the soil of the landfill cap and in gases emanating from materials in the landfill to determine whether redevelopment of the property is feasible. The City of Long Beach has requested the USEPA's assistance under the Regional Brownfields program with evaluating the environmental conditions associated with redeveloping the site.

The investigation was designed to obtain information including the nature and extent of contamination across the entire site. The investigation was also designed to obtain information that may be used by the city of Long Beach in redevelopment plans and cleanup operations.

This report describes the field activities conducted December 4 through December 8, 2000 by the START for the EPA and presents the results of those activities. The following elements are addressed in this report:

- Background information (Section 2)
- Description of assessment activities (Section 3)
- Sample results (Section 4)

- Summary of results and recommendations for development (Section 5)
- Photographic documentation of the site (Appendix B)
- Deviations of the sampling activities from the Sampling and Analysis Plan (Appendix C)
- Laboratory data and validation memoranda (Appendix D)

2 Background

2.1 Site Location

The 55th Way Landfill site is located at 2910 East 55th Way (latitude 33° 51' 25.4" north, longitude 118° 9' 27.3" west), in Long Beach, California (Figure 2-1).

2.2 Site Description

The 55th Way site occupies 5 acres in a mixed recreational, commercial, residential and industrial area of Long Beach, Los Angeles County, California. The site is bordered on the east, south and northwest by single family dwellings and on the north and west by industrial properties.

The only permanent structure on the site is the remains of a condemned 24,000 ft^2 building. Subsidence of the landfill has caused structural damage to the building. The floor has cracked and settled, however the foundation and walls remain intact.

The property is fenced and locked, however holes in the fence allow access. A plywood skateboard ramp has been set up inside the building, and there is evidence that homeless individuals have been living in a trailer at the southeast corner of the building. A fenced area in the southern portion of the site appears to be currently operated as a junk yard.

The legal description of the property is as follows: Lot 2 of Tract No. 22516 as per Map recorded in book 661 Page(s) 18 and 19 of Maps, in the Office of the County Recorder in the County of Los Angeles; together with any and all interest conveyed in those portions of 55th Way and Obispo Avenue, vacated by the City of Long Beach on October 27, 1981, Resolution No. C-2325 and recorded on November 5, 1981, as Instrument No. 81-1100256, Official Records of said County.

2.3 Site History

A Phase I Environmental Assessment is currently being conducted for the site, therefore, background information at the time of preparation of this report is incomplete.

The site is owned by Paul Lai, George Y. Chow, Yung Lung Chien, and Long Beach Warehouse Limited Partnership. The current owners purchased this property in 1987 from Josef and Helen Kraus. Owners prior to the Kraus' have not yet been identified.

The site was part of a 17.4-acre landfill that was owned and operated by the City of Long Beach as Long Beach City Dump #26. The site is the northwest corner of the former landfill. The exact dates of landfill operations is unknown, however, from aerial photos, the site appeared undisturbed until May 1945. During operation the landfill accepted municipal waste from which food wastes were separated to be sold as agricultural feed supplements; only "inedible" rubbish went to the landfill. Reportedly, no liquid wastes were deposited at the site and operations ceased by 1948. However, information from a 1993 memorandum from the California Integrated Waste Management Board (CIWMB) infers that the landfill operated until 1977 receiving mixed municipal waste. A 1987 Environmental Impact Report (EIR) prepared by SCS Engineers (SCS) for proposed development at the southern end of the landfill reported the depth of refuse in the landfill at between 15 to 30 feet. The EIR reported a soil cover over the landfill of between 2 to 4 feet in depth and a depth to groundwater of 48 feet below the top of the landfill surface (SCS 1987).

In January 1958, a baseball field existed on the western edge of the site and the adjacent property. Disturbed earth and vegetation were present over the remainder of the site at that time. A manufacturing and warehouse building had been constructed on the site by 1961. Through the 1970s, building permit applications filed with the City of Long Beach document a number of owners/tenants at the property including manufacturing facilities, a diesel repair facility, and Artesia Milling. One owner/tenant, Dolphin Trucking, filed an application in 1974 to install two underground storage tanks (USTs) (9,940 gallons and 5,000 gallons), pumps and dispensers at the site. It is not known at this time whether the USTs and associated pumps were installed.

In late 1993, the remaining building on the site was declared substandard and a public nuisance; the owners were ordered to

demolish or rehabilitate the structure by January 15, 1994. The deadline for rehabilitation was extended to July 31, 1994. However, no rehabilitation work has been performed to date.

Currently, the site is officially unoccupied, however, a fenced area on the southern border of the site appears to be used as a junk yard. There is also evidence that homeless individuals are living on the site.

2.4 Previous Investigations

There have been multiple investigations of the site by regulatory agencies to measure landfill gas emissions. However, few of these investigations collected data about contaminants potentially present on site other than methane. Pertinent investigations are briefly discussed below.

SCS conducted multiple investigations of the landfill from 1985 through 1987 including an EIR in connection with proposed development. Borings from the investigations indicated that refuse materials at the site consist of moderate to highly decomposed organic material (wood, paper, etc.), glass, metal, and traces of silty and sandy soils. SCS reported a high degree of degradation of landfill materials and posited that although the generation of landfill decomposition gas (LDG) was past the maximum stage generation of LDG could continue for 10 to 20 more years (SCS 1987). Landfill decomposition gas typically contains 55% methane, 40% carbon dioxide, 5% nitrogen, and trace amounts of non-methane organic compounds.

In April 1993, representatives of the California Integrated Waste Management Board (CIWMB) and the Local Enforcement Agency (LEA), which at that time was the City of Long Beach Department of Health and Human Services, Bureau of Environmental Health (LBHHS/EH), investigated the site on two occasions. During these investigations methane levels were monitored in and around the abandoned building and soil-gas samples were collected from cracks in the building floor into SUMMA canisters (CIWMB 1993). Other hazardous gas constituents detected in these samples included chloroform, benzene, 1,1,1-trichloroethane, toluene, tetrachloroethylene, and 1,4-dichlorobenzene.

In 1994, the CIWMB conducted monitoring and sampling at the site on June 14, 16 and July 20. The investigation determined that

concentrations of LDG (measured as methane) at the property boundaries were below regulatory limits. However, the CIWMB documented high concentration of LDG within the landfill itself and recommended exercising "a great deal of caution" with any activity which disturbs the landfill cover integrity. The CWIMB further recommended that a full-scale LDG monitoring program be initiated, the warehouse be demolished, that the soil/waste interface not be disturbed, and that the area be left "open as a non-irrigated space" (CIWMB 1994).

2.5 Regulatory Involvement

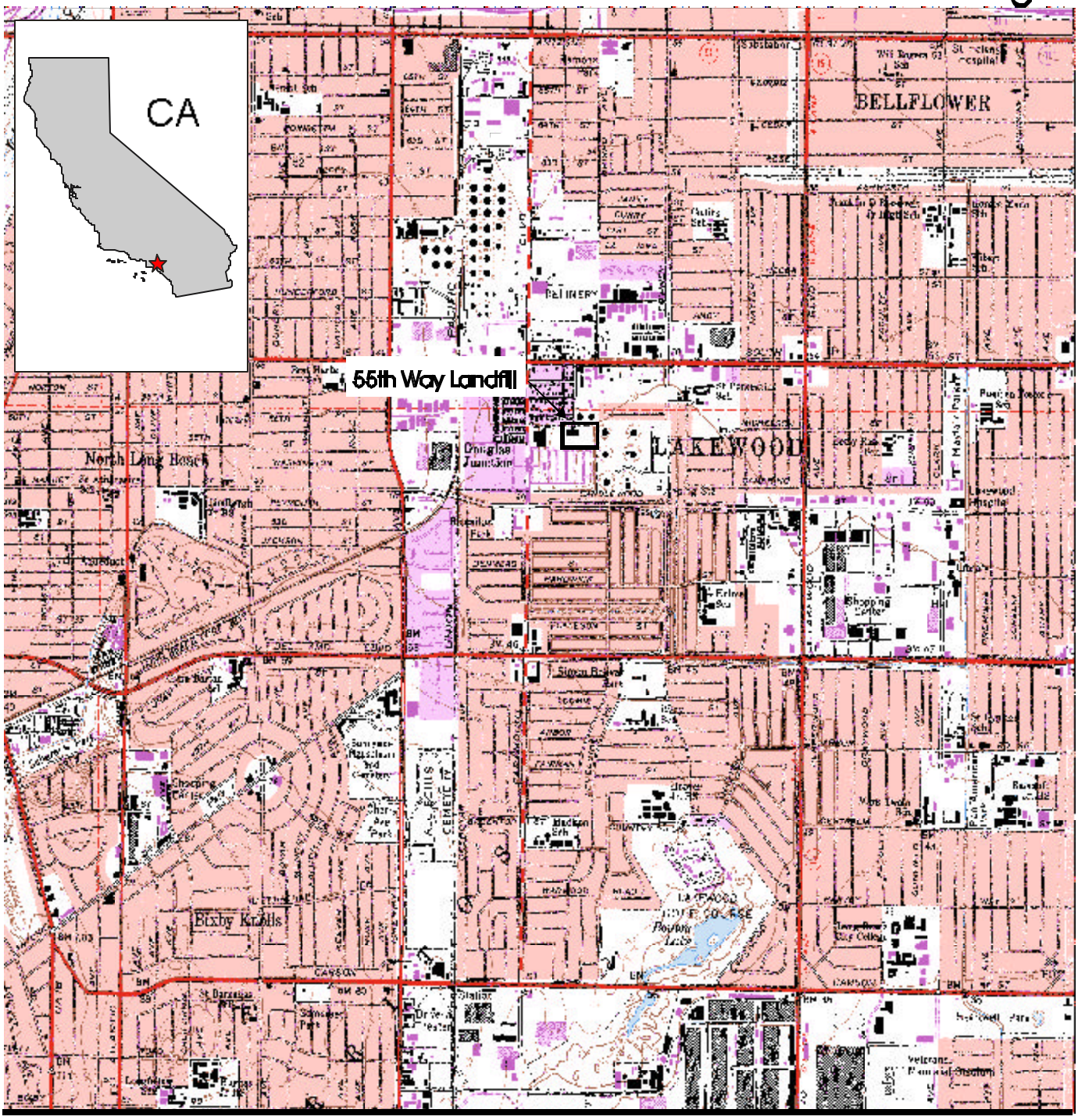
The current LEA for the site is the Los Angeles County Health Department Solid Waste Management Program (SWMP). The County and the LBHHS/EH have each been the LEA for the site during its history.

The CIWMB has conducted several site investigations but has initiated no enforcement actions. In 1993, the LBHHS/EH participated in a joint inspection of the site with the Long Beach Fire and Planning and Building Departments, the CIWMB, and the South Coast Air Quality Management Districts. This began a series of code enforcement actions against the owners of the warehouse building. On September 15, 1993 the building was declared substandard and a public nuisance; the owners were ordered to demolish or rehabilitate the structure by January 15, 1994. The deadline for rehabilitation was extended to July 31, 1994. However, no rehabilitation work has been performed to date.

2.6 Geological Information

According to information collected by SCS for the 1987 EIR, natural soils on the site are generally classified as clayey silts, silty clays, and sandy silts. The natural soils are covered by 15 to 30 feet of refuse materials, and 2 to 4 feet of cover soil.

Under the site the Exposition-Artesia aquifer is first encountered at approximately 50 feet below ground surface (bgs). Other hydrogeologic units beneath the site, in descending order, are the Gage aquifer, Hollydale aquifer, Jefferson aquifer, Lynwood aquifer, Silverado aquifer, and Sunnyside aquifer (California Department of Water Resources 1961). Regional groundwater direction has not been established.



Ecology & Environment, Inc. 2001
Basemap USGS 1:24000 Long Beach Quadrangle

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↑N Not to scale

Figure 2-1
SITE LOCATION MAP
55th WAY LANDFILL
Brownfields Site
Long Beach, CA

3 Assessment Activities

The START conducted sampling and other field activities and at the 55th Way Landfill Site from December 4 through December 8, 2000.

3.1 Soil and Soil-gas Sampling

To characterize the nature and extent of surficial (within the landfill covering) on-site contamination the START collected:

- 18 soil samples and 2 duplicate samples from one to 1.5 feet bgs.
- 18 soil-gas samples and 2 duplicate samples from 2 to 2.5 feet bgs co-located with soil samples.

Either a slim rod slam bar, or hand auger was advanced to 2.5 feet. A stainless steel screen connected to teflon tubing was inserted to 2.5 feet bgs. The samples were collected into pre-evacuated 6-liter SUMMA canisters. Soil samples were collected using hand augers, at the same location from one to 1.5 feet bgs. A systematic sampling grid was used to place sample locations across the site. Four biased sample locations were selected in areas surrounding the warehouse building according to the following rationale:

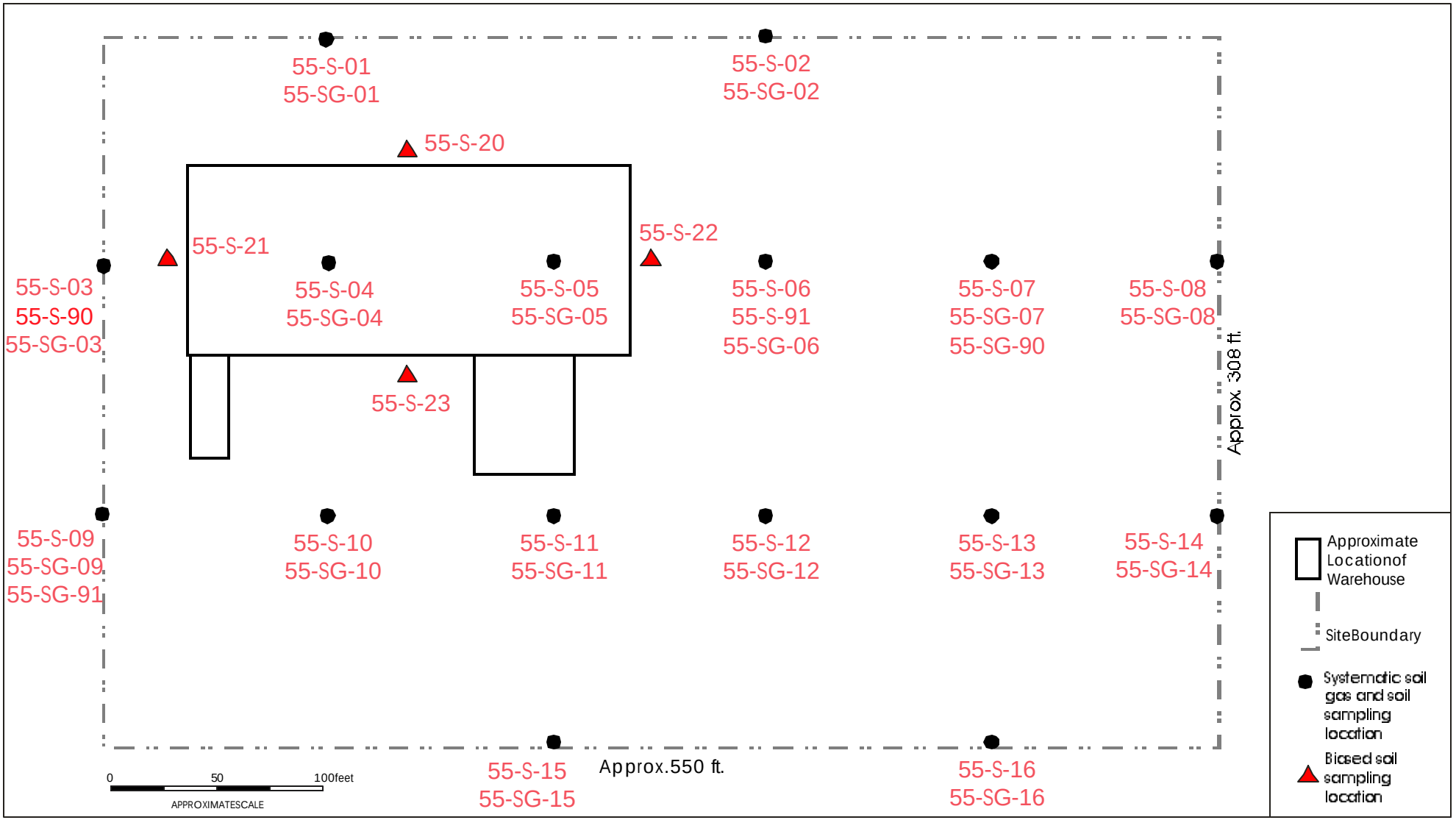
- 55-S-20 and the corresponding soil-gas sample were collected on the west edge of the building in a low area where runoff may have collected concentrating surficial contamination associated with past uses of the building.
- 55-S-21 and the corresponding soil-gas sample were located on the southern side of the building. Refusal was reached at several potential sample locations on the north side of the building. The sample was relocated to the south of the building because the highest readings observed when monitoring soil-

gas while collecting samples from the systematic grid were located on the southern portion of the site.

- 55-S-22 and the corresponding soil-gas sample were collected from the northeast corner of the building. Debris limited access to the eastern edge of the building, so this point was moved to a more accessible location.

- 55-S-23 and the corresponding soil-gas sample were collected immediately to the south of the building where landfill gasses generated near the foundation or under the concrete apron may be venting.

Exact sampling locations of biased and systematic points were recorded with a geographic positioning system. Actual sample locations are shown on Figure 3-1. For more details about the sampling design and procedure, see the SAP (E&E 2001). Exceptions to the sampling scheme proposed in the SAP are noted in Appendix C.



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Project:001275000301BR

Figure 4-1
Sample Location Map
55th Way Landfill Brownfields Site
Long Beach, California

4 Sample Results

EPA Region 9 Laboratories, and commercial laboratories were used for sample analysis. Data generated by commercial laboratories were validated according to the Quality Control (QC) criteria for this project and *USEPA CLP National Funcional Guidelines for Organic Data Review, USEPA 540r-94/012, February 1994* and was found acceptable for project data use objectives. Results from the biased sampling locations were comparable to those from the systematic sampling locations. Thus, both systematic and biased data is discussed and summarized together in this section. All laboratory data and data validation memoranda are included in Appendix D.

4.1 Soil Sampling

4.1.1 Metals

Two inorganic analytes, arsenic and iron, were detected in surface soils at levels exceeding the USEPA Region 9 Residential Preliminary Remediation Goals (PRGs). However, typical California soils contain concentrations of both of these analytes at levels above the EPA Region 9 PRGs (University of California 1996). The maximum concentration of iron in soil from the site, 36,900 mg/kg, was below the California average concentration of 37,000 mg/kg. The average value of arsenic in the soil, 7.37 mg/kg, exceeded the California average value of 3.5 mg/kg. Concentrations of arsenic in four samples (55-S-07, 55-S-12, 55-S-16, and 55-S-22) were over three times the California average concentration of arsenic. Summary data is presented in Table 4-1. For detailed results see Appendix D.

The elevated levels of metals observed on the site may be attributable to naturally occurring levels of arsenic and iron in the soils used as cover material for the landfill.

4.1.2 Petroleum Hydrocarbons

Petroleum hydrocarbons analyzed as oil were detected in every soil sample from the site. Petroleum hydrocarbons as diesel were detected in one soil sample, 55-S-15. Results for petroleum hydrocarbons as oil ranged from 16 to 1,900 mg/kg, with an average value of 330 mg/kg. No PRGs have been established for TPH as diesel or oil therefore the California Regional Water Quality Control Board Soil Screening Levels have been used. Petroleum contamination does not exceed the benchmarks for diesel or oil range hydrocarbons, 1,000 mg/kg and 10,000 mg/kg respectively. Summary data is presented in Table 4-1. For detailed results see Appendix D.

The petroleum contamination as oil is consistent with known past uses of the site. Artesia Milling, Dolphin Trucking, and the diesel repair facility that operated in the warehouse building may have used and had a release of oil type petroleum hydrocarbons to surface soils on the site.

4.1.3 Semi-volatile Organic Compounds

Two semi-volatile organic compounds, benzo(a)pyrene and benzo(b)fluoranthene, were detected above the PRGs in soil sample 55-S-03 from the western boundary of the site. No semi-volatile organic compounds were detected at concentrations over the PRGs in any other soil sample. Semi-volatile tentatively identified compounds (TICs) that are not part of the standard analyte list were detected at every location. The TICs are primarily ketones and aliphatics. Summary data is presented in Table 4-2. For detailed results see Appendix D.

Both analytes exceeding the PRGs, and aliphatic TICs are consistent with petroleum contamination. They may be attributable to known past uses of the site, or may be a constituent of the asphalt paving or attributable to other activities on the neighboring site. The ketone TICs may be constituents of LDG or breakdown products of chemicals in the landfill refuse materials.

4.1.4 Volatile Organic Compounds

No volatile organic compounds were detected above the PRGs in any soil sample from the site. Four compounds, 2-butanone, acetone, benzene, and toluene, were present in the majority of samples. Sample 55-S-16, from the southern boundary of the site, contained an elevated level of acetone over ten times the average for the site. Volatile TICs

detected were predominantly aliphatics. Summary data is presented in Table 4-3. For detailed results see Appendix D.

All volatile organic compounds detected in the majority of samples are common trace constituents of LDG, and were also detected in soil-gas from the site. The benzene, toluene, ethyl benzene, xylene, and aliphatic TICs detected on the site may also be associated with petroleum contamination from past known uses of the site.

4.2 Soil-gas Sampling

4.2.1 Methane

Methane was detected in soil-gas in 16 of the 18 samples, ranging from less than one percent to 43% methane by volume. The upper and lower explosive limits for methane are 15% and 5% respectively. The average concentration of methane measured in soil-gas on the site, 10.7%, is within the explosive range. Methane concentrations in 8 samples exceeded the lower explosive limit. Summary data are presented in Table 4-4. For detailed results see Appendix D.

The presence of methane at these levels indicates that anaerobic degradation of landfill materials is still actively occurring in the landfill. The documented site methane levels indicate the need for a methane collection and control network to address methane migration from the property.

According to the California Code of Regulations, Title 27 (27CCR) §29021(a)(2), "The concentration of methane gas migrating from the landfill must not exceed 5% by volume in air at the facility property boundary or an alternative boundary approved in accordance with §20925." The only result from a location on or near a site boundary exceeding this regulatory limit was methane at 18% by volume in sample 55-SG-15 on the southern border of the property. The southern site boundary lies within the former landfill, therefore this sample does not document migration of methane.

4.2.2 Volatile Organic Compounds

Of the sixty volatile organic compounds analyzed for in each sample, 28 analytes were detected in soil-gas samples from the site. Five compounds (1,2,4-trimethylbenzene, acetone, benzene, ethyl benzene, and toluene) were detected in the majority of samples from the site. All

compounds detected by CIWMB and LBHHS/EH in the 1993 sampling event were detected in this sampling event. Summary data is presented in Table 4-4. For detailed results see Appendix D.

The majority of compounds detected in soil-gas are typical constituents of LDG. Decomposition byproducts such as acetone and 2-butanone and are consistent with the levels of methane observed on the site. Volatiles including 1,2,4-trimethylbenzene, benzene, toluene, xylenes, and MTBE are associated with petroleum contamination, and are consistent with the petroleum hydrocarbons as oil detected on the site. Other detected analytes such as Freon 11 and 12 may have been introduced to the site through landfill refuse materials.

Table 4-1
55th Way Landfill Brownfields
Soil Sample Result Summary - Metals and Petroleum Hydrocarbons
All values in mg/kg

Analyte	PRG	Frequency	Mean	Median	High	Low
Metals (EPA Method 6010, 7000 series)						
Mercury	2.30E+01	18/18	0.133	0.0935	0.49	0.021
Aluminum	7.61E+04	18/18	12,545	13,150.	19,000.	5,350.
Antimony	3.13E+01	0/18	ND	ND	ND	ND
Arsenic	3.90E-01	18/18	7.37	6.4	15.1	1.4
Barium	5.37E+03	18/18	169	173.	260.	72.
Beryllium	1.54E+02	18/18	0.563	0.545	0.849	0.277
Cadmium	3.70E+01	18/18	0.52	0.506	0.986	0.196
Calcium	NA	18/18	13,450.	14,450.	22,400.	3,530.
Chromium	2.10E+02	18/18	26.7	26.9	35.	12.
Cobalt	4.69E+03	18/18	12.7	13.6	17.4	6.09
Copper	2.91E+03	18/18	42.	40.5	104.	14.7
Iron	2.35E+04	18/18	23,728	26,050.	36,900.	10,900.
Lead	4.00E+02	18/18	32.4	35.5	58.3	10.4
Magnesium	NA	18/18	9,604	10,750.	14,100.	3,790.
Manganese	1.76E+03	18/18	485	495	751.	263.
Nickel	1.56E+03	18/18	20.44	21.05	26.	10.4
Potassium	NA	18/18	3,938	3,965.	5,620.	1,940.
Selenium	3.91E+02	18/18	12.7	10.95	30.6	5.16
Silver	3.91E+02	0/18	ND	ND	ND	ND
Sodium	NA	18/18	1,162	1,145.	3,750.	93.6
Thallium[1]	NA	0/18	ND	ND	ND	ND
Vanadium	5.47E+02	18/18	33.7	35.2	47.2	17.1
Zinc	2.35E+04	18/18	107	110.	152.	43.6
Petroleum Hydrocarbons (EPA Method 8015)						
TPH - Diesel	1.00E+03*	1/18	1.6	ND	29.	ND
TPH - Oil	1.00E+04*	18/18	330	150.	1,900.	16.

Shaded values exceed the Preliminary Remediation Goal for residential soil for the associated analyte.
For all results below the detection limit a value of 0 was used in statistical calculations.
mg/kg = milligram per kilogram
ND = not detected
TPH = total petroleum hydrocarbons
* = California Regional Water Quality Control Board Soil Screening Level
Some data are qualified. See Appendix D for details.
[1] = Some thallium data was qualified as rejected due to matrix interferences.
All thallium data may be suspect.

Table 4-2
55th Way Landfill Brownfields
Soil Sample Result Summary - Semi-volatile Organic Compounds
EPA Method 8270 - All values in µg/kg

Analyte	PRG	Frequency	Mean	Median	High	Low
1,2,4-Trichlorobenzene	6.46E+05	0/18	ND	ND	ND	ND
1,2-Dichlorobenzene	3.70E+05	0/18	ND	ND	ND	ND
1,3-Dichlorobenzene	1.32E+04	0/18	ND	ND	ND	ND
1,4-Dichlorobenzene	3.44E+03	0/18	ND	ND	ND	ND
2,4,5-Trichlorophenol	6.11E+06	0/18	ND	ND	ND	ND
2,4,6-Trichlorophenol	4.42E+04	0/18	ND	ND	ND	ND
2,4-Dichlorophenol	1.83E+05	0/18	ND	ND	ND	ND
2,4-Dimethylphenol	1.22E+06	0/18	ND	ND	ND	ND
2,4-Dinitrophenol	1.22E+05	0/18	ND	ND	ND	ND
2,4-Dinitrotoluene	1.22E+05	0/18	ND	ND	ND	ND
2,6-Dinitrotoluene	6.11E+04	0/18	ND	ND	ND	ND
2-Chloronaphthalene	4.94E+06	0/18	ND	ND	ND	ND
2-Chlorophenol	6.34E+04	0/18	ND	ND	ND	ND
2-Methylnaphthalene	NA	1/18	12	ND	220.	ND
2-Methylphenol	3.06E+06	0/18	ND	ND	ND	ND
2-Nitroaniline	3.49E+03	0/18	ND	ND	ND	ND
2-Nitrophenol	NA	0/18	ND	ND	ND	ND
3,3´-Dichlorobenzidine	1.08E+03	0/18	ND	ND	ND	ND
3-Nitroaniline	NA	0/18	ND	ND	ND	ND
4,6-Dinitro-2-methylphenol	NA	0/18	ND	ND	ND	ND
4-Bromophenyl phenyl ether	NA	0/18	ND	ND	ND	ND
4-Chloro-3-methylphenol	NA	0/18	ND	ND	ND	ND
4-Chloroaniline	2.44E+05	0/18	ND	ND	ND	ND
4-Chlorophenyl phenyl ether	NA	0/18	ND	ND	ND	ND
4-Methylphenol	3.06E+05	0/18	ND	ND	ND	ND
4-Nitroaniline	NA	0/18	ND	ND	ND	ND
4-Nitrophenol	4.89E+05	0/18	ND	ND	ND	ND
Acenaphthene	3.68E+06	0/18	ND	ND	ND	ND
Acenaphthylene	NA	0/18	ND	ND	ND	ND
Anthracene	2.19E+07	1/18	10	ND	171.	ND
Benz(a)anthracene	6.21E+02	1/18	31	ND	565.	ND
Benzo(a)pyrene	6.21E+01	1/18	32	ND	578.	ND
Benzo(b)fluoranthene	6.21E+02	1/18	50	ND	902.	ND
Benzo(g,h,i)perylene	NA	1/18	11	ND	203.	ND
Benzo(k)fluoranthene	6.21E+03	1/18	28	ND	495.	ND
Benzoic acid	1.00E+08	0/18	ND	ND	ND	ND
Benzyl alcohol	1.83E+07	0/18	ND	ND	ND	ND
Bis(2-chloroethoxy)methane	NA	0/18	ND	ND	ND	ND
Bis(2-chloroethyl)ether	2.11E+02	0/18	ND	ND	ND	ND
Bis(2-chloroisopropyl)ether	2.88E+03	0/18	ND	ND	ND	ND
Bis(2-chloroisopropyl)ether	6.95E+03	0/18	ND	ND	ND	ND
Bis(2-ethylhexyl)phthalate	3.47E+04	3/18	70	ND	936.	ND
Butyl benzyl phthalate	1.22E+07	1/18	12	ND	216.	ND
Carbazole	2.43E+04	0/18	ND	ND	ND	ND
Chrysene	6.21E+04	2/18	46	ND	790.	ND
Di-n-butyl phthalate	6.11E+06	2/18	37	ND	525.	ND

Table 4-2
55th Way Landfill Brownfields
Soil Sample Result Summary - Semi-volatile Organic Compounds
EPA Method 8270 - All values in µg/kg

Analyte	PRG	Frequency	Mean	Median	High	Low
Di-n-octyl phthalate	1.22E+06	0/18	ND	ND	ND	ND
Dibenz(a,h)anthracene	6.21E+01	0/18	ND	ND	ND	ND
Dibenzofuran	2.91E+05	0/18	ND	ND	ND	ND
Diethyl phthalate	4.89E+07	0/18	ND	ND	ND	ND
Dimethyl phthalate	1.00E+08	0/18	ND	ND	ND	ND
Fluoranthene	2.29E+06	2/18	101	ND	1,770.	ND
Fluorene	2.64E+06	0/18	ND	ND	ND	ND
Hexachlorobenzene	3.04E+02	0/18	ND	ND	ND	ND
Hexachlorobutadiene	6.24E+03	0/18	ND	ND	ND	ND
Hexachlorocyclopentadiene	4.23E+05	0/18	ND	ND	ND	ND
Hexachloroethane	3.47E+04	0/18	ND	ND	ND	ND
Indeno(1,2,3-cd)pyrene	6.21E+02	1/18	4	ND	72.3	ND
Isophorone	5.12E+05	0/18	ND	ND	ND	ND
N-Nitrosodi-n-propylamine	6.95E+01	0/18	ND	ND	ND	ND
N-Nitrosodimethylamine	9.54E+00	0/18	ND	ND	ND	ND
N-Nitrosodiphenylamine	9.93E+04	0/18	ND	ND	ND	ND
Naphthalene	5.59E+04	1/18	27	ND	484.	ND
Nitrobenzene	1.96E+04	0/18	ND	ND	ND	ND
Pentachlorophenol	2.98E+03	0/18	ND	ND	ND	ND
Phenanthrene	NA	3/18	27	ND	230.	ND
Phenol	3.67E+07	0/18	ND	ND	ND	ND
Pyrene	2.31E+06	6/18	126	ND	1,550.	ND

Shaded values exceed the Preliminary Remediation Goal for residential soil for the associated analyte.
For all results below the detection limit a value of 0 was used in statistical calculations.
µg/kg = micrograms per killogram
ND = not detected
Some data are qualified. See Appendix D for details.

Table 4-3
55th Way Landfill Brownfields
Soil Sample Result Summary - Volatile Organic Compounds
EPA Method 8260 - All values in µg/kg

Analyte	PRG	Frequency	Mean	Median	High	Low
1,1,1-Trichloroethane	7.68E+05	0/18	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane	3.84E+02	0/18	ND	ND	ND	ND
1,1,2-Trichloroethane	8.43E+02	0/18	ND	ND	ND	ND
1,1-Dichloroethane	5.89E+05	0/18	ND	ND	ND	ND
1,1-Dichloroethene	5.36E+01	0/18	ND	ND	ND	ND
1,2-Dichlorobenzene	3.70E+05	1/18	0.08	ND	1.46	ND
1,2-Dichloroethane	3.46E+02	0/18	ND	ND	ND	ND
1,2-Dichloroethene, Total	NA	0/18	ND	ND	ND	ND
1,2-Dichloropropane	3.51E+02	0/18	ND	ND	ND	ND
1,3-Dichlorobenzene	1.32E+04	0/18	ND	ND	ND	ND
1,4-Dichlorobenzene	3.44E+03	6/18	1.91	ND	14.7	ND
2-Butanone	7.33E+06	16/18	9.51	6.99	24.9	ND
2-Hexanone	NA	1/18	0.2	ND	3.53	ND
4-Methyl-2-pentanone	7.87E+05	1/18	0.132	ND	2.38	ND
Acetone	1.57E+06	13/18	180	54.9	2,480.	ND
Benzene	6.72E+02	14/18	4.17	2.42	16.4	ND
Bromodichloromethane	1.02E+03	0/18	ND	ND	ND	ND
Bromoform	6.16E+04	0/18	ND	ND	ND	ND
Bromomethane	3.90E+03	0/18	ND	ND	ND	ND
Carbon disulfide	3.55E+05	5/18	1.29	ND	9.55	ND
Carbon tetrachloride	2.39E+02	0/18	ND	ND	ND	ND
Chlorobenzene	1.52E+05	0/18	ND	ND	ND	ND
Chloroethane	3.03E+03	0/18	ND	ND	ND	ND
Chloroform	2.44E+02	0/18	ND	ND	ND	ND
Chloromethane	1.23E+03	0/18	ND	ND	ND	ND
cis-1,2-Dichloroethene	4.29E+04	0/18	ND	ND	ND	ND
cis-1,3-Dichloropropene	NA	0/18	ND	ND	ND	ND
Dibromochloromethane	1.11E+03	0/18	ND	ND	ND	ND
Ethylbenzene	2.30E+05	4/18	0.775	ND	4.54	ND
m,p-Xylene	2.10E+05	3/18	0.88	ND	6.15	ND
Methyl tert-butyl ether	NA	0/18	ND	ND	ND	ND
Methylene chloride	8.88E+03	0/18	ND	ND	ND	ND
o-Xylene	2.10E+05	5/18	0.615	ND	3.04	ND
Styrene	1.70E+06	0/18	ND	ND	ND	ND
Tetrachloroethene	5.69E+03	0/18	ND	ND	ND	ND
Toluene	5.20E+05	14/18	4.47	2.19	20.9	ND
trans-1,2-Dichloroethene	6.32E+04	0/18	ND	ND	ND	ND
trans-1,3-Dichloropropene	NA	0/18	ND	ND	ND	ND
Trichloroethene	2.77E+03	0/18	ND	ND	ND	ND
Trichlorofluoromethane	3.86E+05	0/18	ND	ND	ND	ND
Vinyl acetate	4.26E+05	0/18	ND	ND	ND	ND
Vinyl chloride	2.17E+01	0/18	ND	ND	ND	ND
Xylenes, Total	2.10E+05	3/18	1.29	ND	9.19	ND

Shaded values exceed the Preliminary Remediation Goal for residential soil for the associated analyte.
For all results below the detection limit a value of 0 was used in statistical calculations.
µg/kg = micrograms per killogram
ND = not detected
Some data are qualified. See Appendix D for details.

5

Summary and Recommendations

Soil samples from the 55th Way Landfill site indicate that arsenic, iron, benzo(a)pyrene, and benzo(b)fluoranthene are present on the site at levels above the PRGs for residential soil. Soil-gas samples indicate that methane and a variety of other volatile organic compounds are present in the soil-gas on the site. All analytes detected on the site are consistent with known uses of the site:

- Former landfill - methane and other volatile organic compounds typical of LDG, possible contamination introduced through landfill materials, and naturally occurring levels of metals in cover materials.

- Use of the warehouse building by Artesia Milling, Dolphin Trucking, and a diesel repair facility - surficial petroleum contamination, and associated semi-volatile, and volatile constituents.

There is no indication of contamination due to unknown site activities.

Surficial petroleum contamination is present at the site. However, total petroleum hydrocarbons were detected at levels well below the California Regional Water Quality Control Board Soil Screening Levels. The petroleum contamination observed does not, therefore, appear to warrant any additional sampling or remedial efforts.

Methane was measured at concentrations exceeding the lower explosive limit of 5% by volume in several samples from the central area of the site and one sample from the southern boundary of the site. This indicates that anaerobic degradation of landfill refuse is actively occurring; therefore, a methane monitoring or a methane collection and control network may be needed to prevent migration of methane off of the site.

Redevelopment plans for the site should include a methane monitoring program consistent with landfill closure and post-closure requirements as specified in the applicable sections of Title 14 and Title 27 of the California Code of Regulations. A methane mitigation system will be required for any structures erected to minimize the fire hazard associated with the levels of methane measured on the site. A methane mitigation system will also help to mitigate effects of other toxic compounds, such as acetone, benzene, and toluene, that were detected in the soil-gas on the site. Demolition of the warehouse building will involve an explosion risk. Methane levels should be measured in work zones, and measures should be taken to prevent sparking, or other ignition sources in areas where methane levels approach the lower explosive limit.

Non-irrigated uses of the land are recommended, as irrigation water contributes to the conditions causing anaerobic degradation that produces LDG including methane, and other organic compounds. If anaerobic conditions can be avoided, aerobic degradation would continue produceing primarily carbon dioxide and water.

Care should be taken when redeveloping the property to maintain a final cover with minimum thickness and quality in accordance with the applicable sections of California Code of Regulations, Title 23 (23CCR) §2580 and Title 27(27CCR). Additional fill may be required for installation of site improvements such as plumbing and landscaping without disturbing the landfill cap.

A References

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United States Environmental Protection Agency, Contract Laboratory Program, *National Funcional Guidelines for Organic Data Review, USEPA 540r-94/012,* February 1994.

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B

Photographic Documentation

ECOLOGY AND ENVIRONMENT, INC.
Superfund Technical Assessment and Response Team

55th Way Landfill - Long Beach, California

Project #: 0003.01.BR TDD #: 09-00-12-0003
Photographer: Cheryl LeCompte Date: December 5 - 8, 2000

Photo 1: Creating hole for 55-SG-14 (12/05/00).

Photo 2: Soil-gas sample set up for 55-SG-07 (12/05/00).

Photo 3: Walter creating hole for 55-SG-03 (12/05/00).

Photo 4: Hole at 55-SG-12 before tamping (12/07/00).

Photo 5: Hole 55-SG-12 after tamping (12/07/00).

Photo 6: Purging sample train for sample 55-SG-12 (12/07/00).

Photo 7: Overview of site from NE corner of site (12/08/00).

Photo 8: Southern subleased portion of site (12/08/00).

Photo 9: Eastern wall of building (12/08/00).

Photo 10: Southern wall of building (12/08/00).

Photo 11: Biased location 55-S-21.

Photo 12: Biased location 55-S-23.

Photo 13: Biased location 20 and west side of building (12/08/00).

Photo 14: Inside building (12/08/00).

Photo 15: Biased location 22 and northeast corner of building (12/08/00).

Photo 16: North wall of site (12/08/00).

Photo 17: Location 55-S-6 (12/08/00).

Photo 18: Trailer south of building (12/08/00).

Photo 19: Location 55-S-15 (12/8/00).

Photo 20: View of two story buildings on neighboring property east of the site (12/08/00).

Photo 21: Collecting GPS data (12/08/00).

Photo 22: Slope on north side of landfill (12/08/00).

Photo 23: Slope on north side of landfill (12/08/00).

C

Deviation of Sampling Activities From the Sampling and Analysis Plan (SAP)

Field work was conducted in accordance with the SAP dated January 2001 (E &E 2001) with the following exceptions:

- Samples 55-S-04 and 55-S-05 and corresponding soil-gas samples were not collected because these locations fell inside the warehouse building. The concrete floor of the warehouse has cracked and fallen approximately four feet leaving an uneven concrete surface and no feasible access to soil.

- Point 55-S-15 and the corresponding soil-gas sample was moved west along the southern boundary of the property to the edge of the southern fenced area due to limited access and debris within the fenced area.

- Soil-gas sample trains were purged with the pump of air monitoring equipment (Total Vapor Analyzer or Passport Explosimeter) until the readings stabilized. Instead of using a personal sampling pump for a fixed period of time as specified in the SAP. This enabled the sampler to monitor soil-gas concentrations and ensure that the sample train had been adequately purged.

- Due to equipment failure soil-gas sampling using the slam bar to establish the borehole was not practicable after December 5, 2000. Samples collected on December 5 (55-SG-02-12-05, 55-SG-06-12-05,55-SG-07-12-05, 55-SG-08-12-05, 55-SG-02-12-05, 55-SG-13-12-05, 55-SG-14-12-05, and 55-SG-16-12-05) were collected according to the procedure in the SAP. Soil-gas sampling boreholes for all other samples were developed after collection of the soil sample using the hand auger to continue the borehole to 2.5 feet bgs. The six-inch stainless steel screen attached to sample tubing was in-

serted in the hole, which was then backfilled and firmly tamped. The wider hole may have allowed more influence of ambient air on the soil sample. However, monitoring equipment readings while purging the sample trains were comparable to readings from holes established with the slam bar, thus this change in procedure is not expected to negatively impact data quality.

Sample 55-SG-09-12-06 was collected at one-foot bgs. Monitoring equipment indicated that explosive gasses were present over the lower explosive level at one-foot bgs. With the rocky soil conditions at the location a potential for sparking existed, therefore the borehole was not continued to the desired depth of 2.5 feet to avoid the potential threat to health and safety.

Two equipment blank samples for soil and soil-gas were collected instead of three. The total number of samples and field duplicate samples was reduced to 20 thus only two equipment blanks were needed to meet QA/QC criteria.

D Laboratory Data